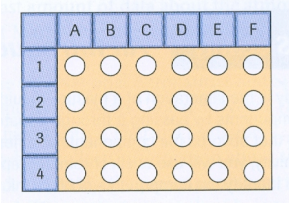
It's Sunday morning. You have been called to a crime scene. The victim, a 26 year-old male caucasian, lies dead on the bedroom floor. His partner claims that a severe heart attack was the cause of death. Closer inspection reveals a mysterious white powder on the bed sheets. You suspect that this powder may have played a role in the death. Blood work will have to be done to see if there are any foreign chemicals present in the bloodstream but you will also have to identify what the mysterious powder is.

Scenarios like these are often encountered by forensic scientists. The role of the forensic scientist is to gather evidence that can then be used in the court of law. In this investigation, you will attempt to identify what the mysterious powder is. In doing so, you will be performing a *qualitative analysis* on six substances. That is, you will be making qualitative observations about six substances and then using your information to identify what the unknown sample is. The quantities of each substance are limited... waste not.

The six substances upon which you will perform your tests are:

aspirin	*sodium dihydrogen phosphate*	*coated aspirin*
sugar	*sodium monohydrogen phosphate*	*baking soda*

PROCEDURE



1. Obtain two microtrays. Make sure they are clean and dry. Position them side by side so that they would resemble the diagram shown in the margin.

2. Using a scoopula, place a small amount of aspirin in each of the four wells in column A. The amount that you should use should be no more than that similar to what you would see if you were looking at the end of a pencil eraser head on.

3. Using a different scoopula, place a small amount of sugar in each of the four wells in column B. Repeat this process for each of the other substances (columns C-F). Take note of which substance you put in which column!

4. Record the appearance of each sample (see <u>*sample chart*</u> on the back).

5. Using an eyedropper, add enough water to each of the six samples in <u>*row 1*</u> so as to fill the well. Be careful so as to not contaminate any of the other wells. Mix the contents of each well carefully, using a toothpick for each well. Record your observations.

   Hint: after you use a toothpick, place it on the lab bench, above the appropriate column and with its contaminated end, facing the column
   Hint: before you add the water, take note of how much of the sample is present. If some or all of the sample disappears, then you know that the sample is soluble in water

6. Using an eyedropper, add <u>one drop</u> of universal indicator to each of the wells in <u>row 1.</u> Record your observations.

7. Using an eyedropper, add enough *hydrochloric acid* to each of the six samples in <u>*row 2*</u> so as to fill the well. Mix the contents of each well with the other end of the toothpick, again taking care as to avoid contamination. Record your observations. Dispose of the toothpick.

(OVER)

8. Using an eyedropper, add enough *iron(III) nitrate* to each of the six samples in <u>*row 3*</u> so as to fill the well. Obtain a new toothpick and mix the contents of each well. Record your observations.

9. Using an eyedropper, add *five drops* of *iodine solution* to each of the samples in <u>*row 4.*</u> Mix the contents with the other end of the toothpick. Record your observations.

10. Obtain the mystery powder from your teacher and attempt to identify what the powder is.

OBSERVATIONS:

	aspirin	sugar	sodium dihydrogen phosphate	coated aspirin	baking soda	sodium monohydrogen phosphate	unknown
Appearance							
Addition of water							
Universal Indicator							
Addition of acid							
Addition of iron(III) nitrate							
Addition of iodine solution							

ANALYSIS:

1. You will be writing up a lab report. In the meantime, in rough... ... be sure in the end to provide answers using complete sentences.

    a. Analyse your data and identify your unknown. Provide your reasoning. How confident are you in your analysis? Explain.
    b. Why was it important to test the six samples before identifying the mystery powder?
    c. Would you say that the knowledge you gathered from the experiment was *empirical* or *theoretical?* Explain.
    d. Go over the experiment. What could you have done wrong *(experimental error)* that would have affected the results?
    e. Of the six tests that you performed (left column in the above table), which would be considered an analysis of the physical properties of the substance? Which would be considered an analysis of the chemical properties of the substance?
    f. List the physical properties that you observed *(ex. Odour – oops, forgot to do that one? It's OK, just list those that you observed)*